Name: Key Date: _____

A2CC Q4T3 Review

This review is not comprehensive. Be sure to study your notes and homework assignments as well.

In addition to this sheet, you must complete the January 2017 Regents exam.

1. The following table shows the results of a survey of people in terms of what type of breakfast they prefer. Based on the table, what is the probability that a person picked at random is over 40 and eats eggs for breakfast?

(1) 0.32 (3) 0.63

(2) 0.47 (4) 0.82

	Eats Cereal	Eats Eggs	
40 and under	23	17	40
Over 40	21	29	50
	44	46	90 total

$\frac{29}{90}$

2. If a standard six sided die is rolled once, what is the probability that the number rolled is either an even or a multiple of 3?

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ (A: even, B: mult of 3)

$= \frac{3}{6} + \frac{2}{6} - \frac{1}{6}$

$= \frac{4}{6}$

1 (2) (3) (4) 5 (6) — mult of 3

(1) $\frac{1}{6}$ (3) $\frac{5}{6}$

(2) $\frac{1}{2}$ (4) $\frac{2}{3}$

3. Prime numbers are positive integers that are only divisible by 1 and themselves, i.e. the set $\{2, 3, 5, 7, ...\}$. If a random number is generated from 1 to 20, what is the probability that it is *not* prime?

(1) 0.2 (3) 0.6

(2) 0.5 (4) 0.8

1 (2) (3) 4 (5) 6 (7) 8 9 10

(11) 12 (13) 14 15 16 (17) 18 (19) 20

$\frac{8}{20}$ prime so $\frac{12}{20}$ not

4. A single standard six-sided die is rolled. What is the probability the roll is a multiple of three given that it is an even number?

$P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$ A = mult. of 3, B = even

$= \frac{\frac{1}{6}}{\frac{3}{6}}$

$= \frac{1}{3}$

1 (2) 3 (4) 5 (6) — mult. of 3

(1) $\frac{1}{6}$ (3) $\frac{1}{2}$

(2) $\frac{1}{3}$ (4) $\frac{5}{6}$

5. The probability on any given work day that Kirk gets less than five hours of sleep the night before and doesn't shave is 0.65. If there is a 0.80 probability on any given day that he doesn't shave and a 0.70 probability h gets less than five hours of sleep, then what is the probability he doesn't shave given that he got less than fiv hours of sleep?

$P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$ A = doesn't shave, B = less than 5 hrs

$= \frac{.65}{.70}$

(1) 0.73 (3) 0.81

(2) 0.78 **(4) 0.93**

6. If two events, A and B, are independent then which of the following statements is always true about their probabilities?

(1) $P(\text{A or B}) = P(\text{A}) + P(\text{B})$

(2) $P(\text{A}) + P(\text{B}) = 1$

(3) $P(\text{A and B}) = P(\text{A}) \cdot P(\text{B})$

(4) $P(\text{B}) = \frac{1}{P(\text{A})}$

7. A die is rolled three times and a curious pattern emerges. On the first roll, the number is greater than 3. On the second roll, the number is greater than 4, and on the third roll, the number is greater than 5. If all three rolls are independent, what is the probability that this occurs?

#>3 #>4 #>5

$\frac{3}{6} \cdot \frac{2}{6} \cdot \frac{1}{6} = \frac{6}{216} = \frac{1}{36}$

(1) $\frac{1}{36}$ (3) $\frac{1}{8}$

(2) $\frac{1}{9}$ (4) $\frac{1}{12}$

8. Subjects in a sleep study are separated by age into two groups. This separation is done to observe which of the following types of variability?

(1) Measurement **(3) Induced**

(2) Natural (4) Sample

9. In which of the following cases would a survey be more appropriate than an experimental study?

(1) A study to determine how age affects the number of hours of sleep a person gets.

(2) A study to determine the most popular show on television on a given night.

(3) A study to determine the commute time to work based on geographic location.

(4) A study to determine if a particular drug lowers cholesterol.

10. On the first day of a small local fair, 55 children, 20 adults, and 25 senior citizens were admitted. If children's tickets cost $5.00 each, adult tickets cost $8.00 each and senior citizen tickets cost $6.00 each, what was the mean ticket price for all 100 people who entered?

(1) $6.35

(3) $5.85

(2) $5.20

(4) $6.33

$55(5) + 20(8) + 25(6)$ money / people

$275 + 160 + 150 = \frac{585}{55+20+25} = \frac{585}{100}$

11. In which of the following situations is a survey least likely to contain bias?

(1) surveying a sample of people leaving a concert about their favorite musicians

(2) surveying the members of a basketball team to determine the average height of high school boys

(3) surveying people leaving a grocery store about their political party affiliation

(4) surveying teenagers who use social networking websites about their favorite communication methods

12. In a survey of 236 freshmen, it was found that 151 of them owned cell phones. Which of the following is closest to the proportion of freshmen who do not own cell phones?

(1) 0.21

(3) 0.43

(2) 0.36

(4) 0.64

$\frac{236-151}{236} = \frac{85}{236}$

13. Students did poorly on a recent test, so their teacher decided to add 6 points to each student's grade. Which of the following statistical measures would not be affected by the addition of these points?

(1) the mean score

(3) the median score

(2) the first quartile

(4) the standard deviation of the scores

14. In 2013, the mean gas mileage for cars was 27.6 miles per gallon. If the distribution of gas mileage in cars is normal with a standard deviation of 3.8 miles per gallon, then what percent of cars had gas mileages between 20 and 30 miles per gallon?

(1) 28%

(3) 71%

(2) 56%

(4) 98%

normalcdf(20, 30, 27.6, 3.8) = .7134

low: 20

high: 30

$\mu = 27.6$

$\sigma = 3.8$

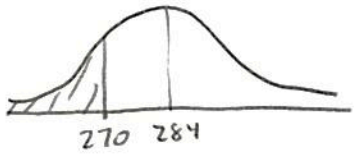
15. The gestation time (number of days before birth) for cows is normally distributed with a mean of 284 days and a standard deviation of 12 days. At a local ranch, over the course of a year there are 820 calf births. C these, how many would be expected to have a gestation time less than 270 days?

(1) 12

(3) 100

(2) 78

(4) 237



low: -99999
high: 270
μ = 284
θ = 12

= .12167

.12167 × 820 = 99.7

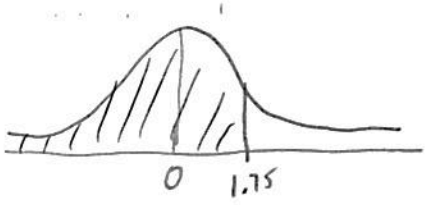
16. A value's percentile rank is the percent of a data set that lies at or below it. On a standardized test where the scores were normally distributed, Jeremy's score was 1.75 standard deviations above the mean. Which of the following is closest to his percentile rank?

(1) 54th

(3) 83rd

(2) 67th

(4) 96th



low = -99999
high = 1.75
μ = 0
θ = 1

17. Mr. Richmond's traffic engineering class is trying to determine people's attitudes towards their evening commute. Students in his class decide to stop drivers on their way home to conduct this survey. Why woul this survey method introduce bias into their results?

They may be grumpy after a long day of work.

18. At a local PTA meeting, a sample of parents were surveyed to determine how many children they currently had attending school. Their results are shown in the frequency table below:

L_1 Number of Children	L_2 Number of Families
1	16
2	24
3	8
4	3
5	2
7	2

Determine the mean, median, and standard deviation for this sample. Round any non-integer answers to the nearest tenth.

$\bar{x} = 2.3$
med = 2
$\sigma x = 1.4$

1-Var Stats
List: L_1
Freq list: L_2

Determine how many of the 55 families surveyed have a number of children that was within one standard deviation of the mean. Show your analysis.

$2.3 + 1.4 = 3.7$
$2.3 - 1.4 = .9$

$16 + 24 + 8 = 48$

48

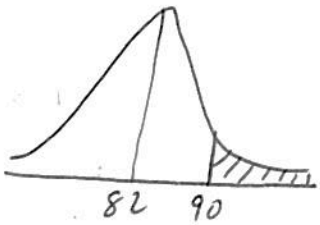
19. The scores on a standardized test that Jeremy took were normally distributed with a mean of 82 and a standard deviation of 5. On the test, Jeremy scored a 90.

(a) What percent of students scored better than Jeremy on this test? Round to the nearest tenth of a percent.

normal cdf
low: 90
high: 99999
$\mu = 82$
$\sigma = 5$

$= .05479$

5.5%



(b) If Lisa took the same test, at a different time, and the scores were again normally distributed with a mean now of 83 and a standard deviation of 6.4, then what score, to the nearest integer, would make her percentile rank the same as Jeremy's? Show how you arrived at your answer.

$100 - 5.5 = 94.5$ percentile

InvNorm =
area = .945
$\mu = 83$
$\sigma = 6.4$

93.2

Score 93

20. Water is flowing out of a reservoir such that the depth of the water is a decreasing function of the number of hours since water was released. Engineers measure the depth of the water and their results are shown in th table below.

Time, x (hours)	2	4	8	14	20
Depth of Water, y (ft)	44.7	36.8	29.2	22.3	15.1

(a) Find an exponential equation, of the form $y = a(b)^x$, that best fits this data set. Round your coefficients to the nearest *hundredth*. Then, use your equation to predict the depth of water after 2 days have elapsed. Round your depth to the nearest *tenth* of a foot.

$y = ab^x$

$a = 47.96967$

$b = .94424$

$y = 47.97(.94)^x$

$y = 47.97(.94)^2$

$y = 42.4$ ft

(b) How would you characterize the strength of the exponential correlation between the two variables? Explain.

Great! r is extremely close to -1

21. A population that is normally distributed has a mean of 164 and standard deviation of 18.65. If a sample of size 50 was taken from this population, what is the probability its mean would be greater than 168? Show how you arrived at your answer. Round to the nearest tenth of a percent.

Low = 168

high = 99999

$\mu = 164$

$\sigma = 18.65$

41.5%

.415

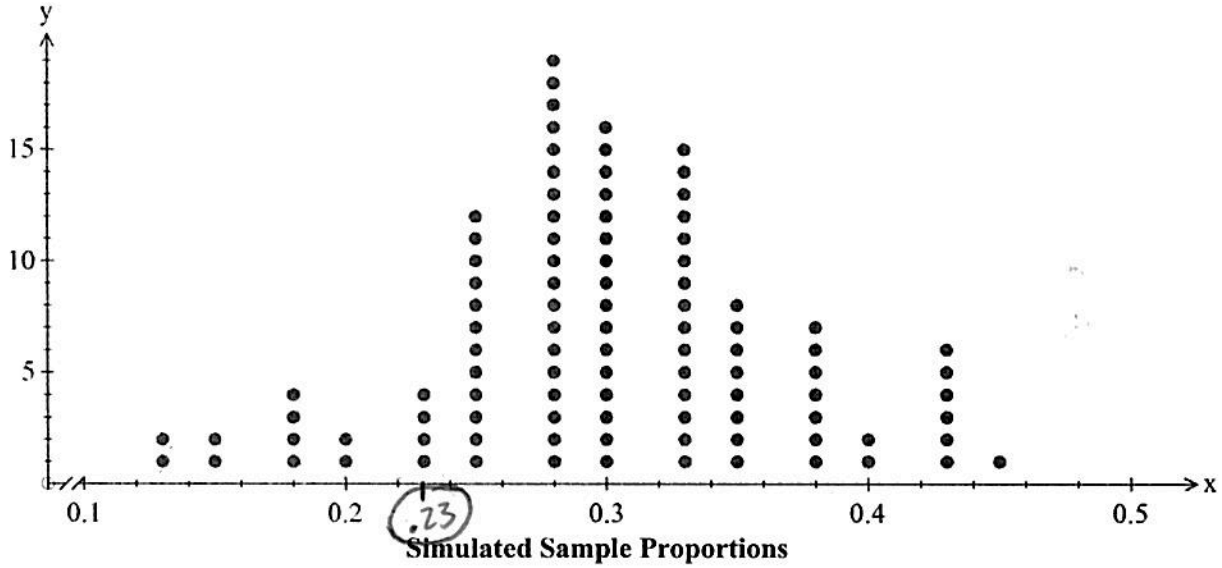
22. In a recent survey of 500 people, 45% of them reported that they were going to vote for Candidate A in an upcoming election. If the survey was reported to have a margin of error of 2%, explain what this means in terms of the actual support for Candidate A.

45 + 2 = 47

45 - 2 = 43

Highly confident support is between 43% and 47%.

23. A survey of 40 high school students was done to determine how many of them liked fresh fruit for lunch. The school will offer a fresh fruit option if more than 30% of students like fruit. Of the 40 surveyed, only of them stated that they liked fruit with lunch. Simulations were done with a population proportion of 0.3 and a sample size of 40 to see how likely a sample of 40 would have only 9 who liked fruit. The results of 100 simulations are shown below.



Simulated Sample Proportions

(a) What was the observed sample proportion for this survey? Round to the nearest hundredth.

$\frac{9}{40} =$ .23

(b) If the true population proportion is 0.30, then how likely is it, based on this simulation, that a sample of size 40 would have 9 or fewer students say they like fruit for lunch?

only 14 had .23 or less

14% somewhat unlikely

(c) Based on this survey, should the school conclude that they should not serve fruit for lunch? Explain your reasoning.

Good chance that 30% threshold will be met. Therefore they should serve it.

24. In a local neighborhood, there are nine total children who range in age from three years old to eleven. Their names, genders, and ages are shown below arranged in alphabetical order. Answer the following questions.

Name	Gender	Age
Evie	Girl	7
Elliette	Girl	8
Luca	Boy	6
Max	Boy	11
Niko	Boy	5
Phoebe	Girl	3
Rosie	Girl	7
Zeke	Boy	7
Zoe	Girl	6

(a) If a child is chosen at random, what is the probability they are a girl?

$\frac{5}{9}$

(b) What is the probability that a child chosen at random will have a name beginning with an E given they are a girl?

$\frac{P(\text{Both})}{P(E)} \qquad \frac{2}{5}$

(c) If a child is chosen at random, what the probability they are either a girl or older than 6?

$P(\text{OR}) = P(\text{Girl}) + P(\text{Older than 6}) - P(\text{Both})$

$= \frac{5}{9} + \frac{5}{9} - \frac{3}{9} = \boxed{\frac{7}{9}}$

(d) If a child is chosen at random, is the child being less than 7 independent of the child's gender? Expla how you arrived at your answer.

$P(\text{less than 7} \mid \text{Male}) = \frac{2}{4}$

$P(\text{less than 7}) = \frac{4}{9}$

$P(\text{less than 7} \mid \text{Female}) = \frac{2}{5}$

$\frac{2}{4} \neq \frac{4}{9} \qquad \frac{2}{5} \neq \frac{4}{9}$

Not independent

25. A school system did not use up all of its snow days and will get four of them back as vacation days, either in April or in May. A survey was done amongst the student body to determine the preference for which month to have the days off. The results are presented below arranged by class.

	April	May
9th Grade	166	64
10th Grade	160	96
11th Grade	124	117
12th Grade	88	132
	538	409

(a) What percent of the students preferred having the days off in April? Round to the nearest percent.

$\frac{538}{947} = 57\%$

(b) If a student from this survey was chosen at random, what is the probability they would be an upperclassman (11th or 12th) and preferred having days off in May?

$\frac{117+132}{947} = 26\%$

(c) If a student is chosen at random, what is the probability that they are a 10th grader given that they preferred to have the days off in April?

$P(10^{th} | April) = \frac{160}{538} = .297 \quad 30\%$

(d) Is the preference for the month independent of the grade of the student? Explain how you made your determination.

$P(April) = 57\%$ $\quad P(April | 10^{th}) = \frac{160}{256} = .625$

Not the same $\longrightarrow$ 62.5%

Not Independent

26. In a survey of 500 high school students, 85% said they liked pizza while 68% said they liked hot dogs and 61% reported liking both. How many students in the survey reported liking neither pizza nor hot dogs? Show how you arrived at your answer.

$P(Pizza \text{ or } Hot\ dogs) = P(Pizza) + P(Hot\ dogs) - P(Both)$

$= .85 + .68 - .61$

$P(OR) = .92$

$1 - OR = Neither \qquad 1 - .92 = .08$

$.08 \times 500 =$ 40 students